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CORRESPONDENCE  
INCOMING LETTER

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BUTLER, R A  
CANNODE, G R  
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KAROL, M S  
LEWIS, L  
LINDSAY, D  
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ROBERSON, J M X  
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SARGENT, D W  
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

999 18th STREET SUITE 500  
DENVER COLORADO 80202 2466

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Mr Richard Schassburger  
U S Department of Energy  
Rocky Flats Plant  
P O Box 928  
Golden CO 80402 0928

Mr Gary Baughman  
Hazardous Waste Facilities Unit Leader  
Colorado Department of Health  
4300 Cherry Creek Drive South  
Denver CO 80222 1530

re Review of Operable Unit 1 Final Phase  
III RFI/RI Report Environmental  
Evaluation

Gentlemen

Enclosed are EPA's comments on the above referenced document. The purpose of the separate submittal is to focus DOE's attention on the need for closer coordination between DOE and the regulatory agencies early in the environmental evaluation (EE) to achieve consensus on key issues which directly affect the results. This need became evident in our review of the referenced report. The issues are

- 1 An evaluation of how well the field sampling strategy and results meet the established EE data quality objectives
- 2 The studies which provide the basis for the toxicity reference values (TRV). The general quality of the studies available for assessing adverse effects of contaminants on environmental receptors is variable. The choice of study in an EE implicitly defines what is considered to be protective and thus has a direct effect on the EE conclusion. A thorough summary of the studies (including doses, test animals, method of exposure, and observed adverse effects) should be provided to both EPA and CDH for review and discussion before TRVs are developed. TRVs should be developed with consensus among all parties.
- 3 The selection of contaminants and receptors of concern should be accomplished with input from the regulatory agencies.

ADMIN RECORD

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4 Consideration of home ranges in exposure assessment Data aggregation must consider spatial and temporal distributions of both receptors and contaminants therefore considerations may be variable depending on pathways under evaluation receptors and level of protectiveness These are decisions which necessarily must be made with consensus among all parties

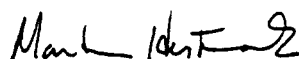
5 Consensus on the concept and appropriate use of the maximum acceptable tissue concentration for specific contaminants

There may be other issues which arise during the evaluation of other operable units Revitalization of the Risk Assessment Technical Working Group (RATWG) to address these issues in a timely manner is essential to avoid future problems We believe that DOE should be responsible for facilitation of these meetings DOE is in the best position to identify issues as early as possible in the process because of early access to data and frequent contact with contractors actually performing the evaluations DOE will likely find that agreement on key issues early in the EE process will lead to the development of an acceptable report The effort required to manage the RATWG is clearly in DOE's best interest

The OU 1 EE is acceptable provided the enclosed comments are addressed satisfactorily All parties have agreed to defer the conclusions regarding the aquatic ecosystem to OU 5 Additionally if protection of individuals becomes an issue at other operable units because of the presence of species of concern the concepts applied at OU 1 may not be adequate In summary all three parties need to begin building on the work that has been done in OU 1 to successfully complete the remaining EE work

Any questions regarding the enclosed comments can be directed to Bonnie Lavelle at (303)294 1067, or Gary Kleeman at (303)294-1071

Sincerely



Martin Hestmark Manager  
Rocky Flats Project

cc Bruce Thatcher DOE  
Fred Harrington EG&G  
Joe Schieffelin CDH

## EPA COMMENTS ON OPERABLE UNIT 1 ENVIRONMENTAL EVALUATION

The Environmental Evaluation (EE) was reviewed with the assumption that contaminants were correctly identified from an analysis of the OU 1 abiotic data. If additional contaminants are identified as a result of review of the nature and extent portion of this report, they must be evaluated for ecotoxicity, extent of contamination, and additional factors per the EE contaminants of concern (COC) selection criteria. Additional COCs must be carried through the environmental evaluation process.

### General Comments

- 1 The final RFI/RI report provides vegetation maps for the first time. The text description of the reclaimed grassland includes the information that reseeded took place some time ago to repair a denuded condition caused by the removal of wastes from the area. It was speculated by the descriptions of the disturbed areas that they currently are sparsely vegetated with weedy species. The report states several times that there is no reason to believe contamination by chemicals was involved in denuding these areas and maintaining low cover and limited diversity. On reviewing the vegetation map (Figure E7.1), however, it becomes apparent that reclaimed grassland and disturbed land together account for about half of the OU1 study area and that the majority of COC detections exceeding ecological effects criteria were from samples collected from those areas. The rationale for determining that reclaimed grassland and disturbed land have not been affected by contamination should be provided, and the apparent inability of native species to recolonize the areas after what appears to be a long period of disturbance should be discussed. In addition, rationale should be provided for not comparing these areas with mesic grasslands, which probably covered the areas until the native community disappeared.
- 2 Units for radionuclide contamination are not used consistently through the report, nor are conversions provided.
- 3 The discussion of ecological effects (Appendix E, Section E.7) indicates that EPA's Rapid Bioassessment Protocol (RBP) was used to evaluate the biological health of Woman Creek. RBP requires the comparison of an affected area with another area that is representative of the natural condition of the affected area. Because of several differences in flow and structure, it was determined that Rock Creek should not be used for comparison as originally proposed. Instead, it appears that sample locations in Woman Creek upstream from OU1 were used for comparison. The sites used for this comparison have not been identified. Toxicity tests on water from upstream Woman Creek locations resulted in significant deaths to *Ceriodaphnia* sp. The explanation provided for those deaths was that the locations had been contaminated but not by OU1. If those locations were used for the RBP analysis of stream health, a rationale must be provided explaining the acceptability of using one contaminated

site as the base of comparison for another. In addition, the RBP comparison of ephemeroptera (mayflies), plecoptera (stoneflies), and trichoptera (caddisflies) (EPT) between Woman Creek stations near OU1 and those upstream does not seem to account for the headwater nature of the stream. This situation and the expectation for increased presence of EPT fauna farther downstream are discussed earlier in the EE and should be included in the explanation of results.

### Specific Comments

- 3 Page E2 15, Third Paragraph The first sentence is missing some words and does not make sense. The sentence should be reviewed and rewritten.

- 4 Page E4 2, First Paragraph, Contaminants of Concern Selection Criteria.

The selection criteria that was developed in conjunction with EPA and CDH was finalized in September 1991 and documented in Section 4 of the November 1991 OU 1 Environmental Evaluation Field Sampling Plan. However, the criteria described here in the final RI and apparently implemented is different from the agreed upon criteria. The RI contains the statement: briefly, a chemical must have been detected in samples from abiotic media and expected to have occurred in the waste stream or been accidentally released. The original criteria was based on existing data from abiotic media or waste stream identification and disposal practices. The effect of changing the criteria is that contaminants were eliminated from further consideration even though detected in abiotic media. The intent of EPA in developing the original criteria was to include certain contaminants even if detected at low frequency in abiotic media if there is evidence that they may have been part of the Rocky Flats waste stream or disposal practices. DOE has unilaterally chosen to deviate from an agreed upon methodology. Although this deviation does not appear to have serious consequences in OU 1, it will not be tolerated in other operable unit environmental evaluations. The originally agreed upon criteria must be applied in these subsequent evaluations.

- 5 Page E4 3, Section E4 2, Identification of OU 1 Contaminants of Concern.

A discussion of the adequacy of the database in meeting data quality objectives (DQOs) for the environmental evaluation is essential to an understanding of the uncertainty in selecting the COCs. Uncertainty in every phase of the EE must be understood in order to correctly interpret the conclusions. For example, the surface soil sampling program was designed primarily to support the human health risk assessment as stated in the final Technical Memorandum 5 for OU 1. This exercise is not intended to support the environmental evaluation for OU 1 but may provide useful information for that study. An analysis of EE DQOs will greatly add to the understanding of the uncertainty associated with using the OU 1 database as the basis

for selecting environmental evaluation COCs Was the data collected in such a manner that the areas of potential exposure unique to the receptors on OU 1 have been adequately characterized?

6 Page E4 5, Section E4 2.5, Uranium 233, 234.

The text in this section is not consistent with Table E4 2 potential contaminants at OU1 The table indicates that uranium was detected above background in only two media surface soils and subsurface soils The text indicates it was detected above background in surface soils subsurface soils groundwater and surface water If the text is correct the exclusion of consideration of exposure of aquatic species to uranium is indefensible A complete characterization of exposure of aquatic species to uranium must be completed

7 Page E4 6, Section E4.2 8, Carbon Tetrachloride.

The potential for carbon tetrachloride to volatilize is at least as high as the trichloroethanes and dichloroethenes (as indicated by Henry s Law Constant) Therefore EPA expected that inhalation of air within animal burrows would be assessed for this contaminant No explanation is given therefore this is an apparent omission Include this pathway in the exposure assessment in section E 6 or provide a justification in section E 4 for why it can be excluded

8 Page E4 9, Section E4 2.13, Toluene

a The text in this section is not consistent with Table E4 4 The table reports that the maximum concentration of toluene in groundwater is 270 ug/l and the text reports it as 120 mg/kg Please correct

b This section should contain a clear and complete explanation of the choice of contaminants as COCs Instead the discussion of COCs for groundwater surface water, and soils is provided to a limited extent and the discussion of COCs for sediment is incomplete Provide the following information to make the section complete

1) Provide the rationale for the inclusion of toluene as a contaminant of concern for sediment in this section Although it is included in table E4 4 the rationale is not presented until section E5 adding unnecessary confusion

2) Sediment TRV explanations are omitted when other media TRVs are discussed Provide these explanations in this section of the report in order to justify the choice of sediment COCs

- 9 Page E4 9, Third Paragraph The text states that dermal exposure to a concentration of 300  $\mu\text{g/kg}$  of benzo(a)pyrene has been found to cause cancer in mice and is considered in the EE to protect young mice or other mammals that spend the early part of their lives in burrows. The way this will protect mice is not clear if contact with that concentration has been shown to cause cancer. This should be clarified in the text.
- 10 Page E5 4, last Paragraph.  
Provide the reference EPA 1985. It is missing from the reference section.
- 11 Page E5 5, Second Paragraph.  
Provide a reference for the acute to chronic ratio of 8/7 for trichloroethane.
- 12 Page E5 5, Second Paragraph The text discusses Woman Creek water quality standards and states that values provided are for Class 1 streams because the Colorado Water Quality Control Commission (WQCC) has not classified Woman Creek otherwise. The basis for this is unclear because a notice from the WQCC dated February 11, 1993, revised water quality standards for the Big Dry Creek basin including Woman and Walnut Creeks to become effective March 30, 1993. This notice appears to classify the mainstream and all tributaries of Woman Creek to the outlet of Pond C 2 (segment 5) as aquatic life 2, recreation 2, water supply and agriculture. The standards should be reviewed and the text clarified.
- 13 Page E5 7, Section E 5 1 2.3, Maximum Allowable Tissue Concentration  
Safe lethal toxic effects is an oxymoron. A more appropriate definition of the maximum allowable tissue concentration (MATC) is the lowest tissue concentration that correlates with adverse effects. The MATC is in units of total contaminant per unit body weight on a whole body basis. Modify this section to reflect the correct definition. More importantly, if the basis for the development of MATCs is mortality, the MATCs can not be considered to be protective. Sublethal effects must also be considered. This may require a thorough literature search.
- 14 Page E5 12, Section E5.2 2, Plutonium 239/240, Americium 241, Uranium  
EPA has the following serious concerns regarding the lack of consideration of both particulate inhalation and the soil ingestion exposure pathways for the radionuclides:  
a The observed health effects associated with exposure to plutonium are generally more serious via the inhalation route as evidenced by the health effects information summarized in the ATSDR Toxicity Profile for plutonium. Adverse health effects from inhalation have been observed at lower doses than

via the oral route of exposure. The profile states: Exposure by the oral route may occur; however, absorption of plutonium from the gastrointestinal tract appears to be limited. The most common route of exposure to plutonium is inhalation. Ignoring this exposure route could potentially underestimate the dose to receptors at OU1.

- b Consider the difference between the mean soil concentration for plutonium (reported as 295 nCi/kg table E6 8) and the mean plutonium concentration in vegetation (reported as 0.015 nCi/kg table E6 7). The four orders of magnitude difference between these two concentrations suggests that consideration of soil ingestion may significantly affect the results of the exposure assessment. Wildlife may ingest substantial amounts of soil while feeding. Concentrations of some elements and environmental contaminants in ingested soil may be so high in comparison to the concentrations in an animal's food that the soil is an important means of exposure. Given the soil concentrations in OU 1, soil ingestion at a fraction of the daily food ingestion rate will result in plutonium doses that are several orders of magnitude higher than doses resulting from vegetation ingestion only.
- c No explanation is provided for the choice of 0.1 rad/day as the maximum allowable dose rate. While the referenced IAEA publication indicates that this dose rate may be protective of populations, EPA does not believe that protection of individuals (as required in the case of species of concern) is demonstrated. For what adverse effect is 0.1 rad/day protective? Are the ecological conditions under which this dose rate was determined similar to the Rocky Flats site?
- d Equation E5 6 takes only one exposure pathway into account: ingestion of vegetation. A straightforward calculation of the total radionuclide dose resulting from chronic soil ingestion, food ingestion, and particulate inhalation is a more complete characterization of exposure. This dose should then be compared with a maximum allowable dose.

15 Page E5 13, last paragraph

If the ecological effects criterion is based on an acceptable tissue concentration resulting from ingestion of vegetation, the soil criterion should be calculated using a ratio of concentration in soil to concentration in vegetation. The text indicates the ratio was of concentration in deer mice and soil. This is incorrect.

16 Page E6 3, Section E6 1 1 1, Sources and Transport of Contaminants at OU1

Although briefly mentioned in the text, there is no quantification of fate and transport of contaminants from either the primary sources (contaminated soil) or the secondary

or tertiary sources (groundwater subsurface soils sediments) Particularly the impact of surface runoff from contaminated areas on aquatic receptors and groundwater transport of existing contamination should be recognized and quantified to the extent possible As the document is currently written with no consideration of fate and transport the exposure assessment is incomplete

17 Page E6 3, Section E6.1.1.1, Sources and Transport of Contaminants at OU 1

The list of potential contaminants in this section is not consistent with Table E4 2  
The following inconsistencies were noted

- a Selenium and vanadium are potential contaminants in groundwater
- b Plutonium americium and uranium are not listed as potential groundwater contaminants in Table E4 2 but are listed as such in Section E6 1 1 1
- c Plutonium and americium are not listed as potential sediment contaminants in Section E6 1 1 1 but are listed as such in Table E4 2

These inconsistencies detract from the credibility of the document The use of the terms preliminary contaminants potential contaminants and contaminants of concern also add confusion If these terms must be used provide a detailed explanation of each in Section E 4 where they are first used

18 Page E6 7, Third Paragraph The text states that no representative vegetation species have been designated as key receptors because little information is available on toxicity to native species Risks were to be based on community effects The vegetation communities most likely to have effects however (reclaimed grassland and disturbed land) were not compared with areas that are likely to demonstrate less affected conditions such as mesic grasslands The current analysis is biased to negate risks or effects of contamination

19 Page E6 11, Section E6 1 3, Exposure Units and Data Aggregation

EPA agrees that life history information and activity patterns of the key receptors are appropriate to consider when aggregating data for ecological exposure assessments Applying this concept we agree that for those receptors whose home ranges are greater than the operable unit area the OU 1 site wide mean value of contaminant concentration is appropriate as an estimate of the lifetime exposure concentration However for those receptors with home ranges smaller than the operable unit area such as the small mammals identified as receptors of concern at OU 1 a sitewide mean value may not be appropriate DOE s approach to data aggregation for these receptors with smaller home ranges may not be consistent with the EPA guidance document Framework for Ecological Risk Assessment which requires that



consideration be given to the spatial and temporal distribution of both the ecological component and the stressor in order to evaluate exposure

- 20 Page E7 6, First Paragraph The text states that use of the RBP required quantitative comparisons of diversity using the Shannon Weaver index The RBP does not require diversity analyses The rationale for inclusion of the Shannon Weaver analyses should be provided

In addition the RBP includes an evaluation of the tolerance of organisms in the stream to organic pollutants using the Hilsenhoff family biotic index (FBI) The designations of tolerance in the FBI are based on contaminants related to discharges from wastewater treatment plants farmlands and livestock operations The text should account for differences that might be observed when the potential organic contaminants are PAHs or solvents The index should not be used to evaluate contamination by metals or radionuclides

- 21 Page E7 18, Second Paragraph The text states that the RBP was developed specifically for lotic (lake and pond) systems However lotic systems are flowing water systems not lakes and ponds The text should be corrected
- 22 Page E9 5, Third Paragraph The text states that the reclaimed grassland could not be compared with native grassland in the reference area because it was apparently seeded with introduced species This is not accurate Cover comparisons could be made and potential effects of contaminants on the reestablishment of native species could be evaluated It is not adequate to say disturbed areas cannot be compared with their natural counterparts when the reasons for the disturbance are unknown and the disturbed areas display higher contamination than any others at OU1 These analyses should be made or more complete rationales provided including age and type of disturbance and age of reclamation effort The data provided for the reclaimed areas indicate there has been very little re establishment of native species It is apparent from the data that re establishment has been prevented by something other than dense stands of the seeded grasses
- 23 Page E9 12, Second Paragraph The text states that aquatic toxicity screens for the EE indicated a lack of toxicity to the cladoceran and fathead minnow While this is generally true for the minnow it is not entirely true for *Ceriodaphnia sp* Survival of the cladoceran in water from Station WOR 13 was just over half (11 of 20) This is generally considered to be indicative of toxic water Survival of the cladoceran was 5 of 20 in water from SW033 located approximately due south of Building 881 and OU1 The text should be clarified to identify those locations specifically thought to be influenced by OU1
- 24 Page E9 13, Third Paragraph The text states that an abrupt change in habitat or water quality as a result of the introduction of pollutants would be seen in a decrease

in the abundance of intolerant species or an increase in tolerant species resulting in a shift in the FBI. The FBI was developed as an indicator of stream quality in relation to organic pollution particularly that associated with wastewater treatment plant discharges and farming. It was not designed to identify effects of metal or radionuclide contamination. The text should be clarified.

#### Appendix E, Figures

- 25 Figure E7.1 The color in the legend for xeric grassland does not correspond to the color on the map. This should be corrected.

#### Appendix E, Tables

- 26 Table E4.3, Occurrence of Potential Contaminants at OU1.

Footnote b of this table indicates that frequency of detection was determined for radionuclides as the percent of total samples exceeding background. This is not consistent with the established criteria of greater than 5 percent of total samples analyzed for the entire OU. The correct criterion was applied to the metals, selenium and vanadium. No explanation is offered for the deviation from the established criteria for radionuclides. Why were the radionuclides treated differently from the metals? Modify the table to reflect the percent of total OU 1 samples in which each radionuclide was detected. If this results in a different determination of contaminants of concern, a full characterization of exposure must be completed for these additional contaminants.

Uranium was detected in 5% of the subsurface soils in OU 1. The table must be modified to reflect this.

- 27 Table E4.5 This table lists 1,1,1-tetrachloroethane as a COC. This should be changed to 1,1,1-trichloroethane.

- 28 Table E5.1, Sediment Quality Criteria for OU 1 Environmental Evaluation

The surface water TRV for toluene listed in this table is less conservative than the TRV listed in Table E4.4. This raises questions about the protectiveness of the sediment quality criteria. Please verify both tables and correct as necessary.

- 29 Table E5.3, Ecological Effects Criteria for OU 1 Environmental Evaluation

This table is incomplete. The following information is noted as missing and there may be additional information that needs to be added:

- a Selenium was identified as a COC based on potential vegetation effects  
Therefore an ecological effects criterion for direct contact of vegetation with selenium in groundwater should be established
- b The text in section E5 2 4 states that the value of 2 000 ug/l for PCE was adopted as the ecological effects criterion for carbon tetrachloride because of similarities between the two compounds in physical characteristics and persistence The table should reflect this as the ecological criteria for direct contact with vegetation
- c Ecological effects criterion for exposure of aquatic species to uranium must be developed since uranium was identified in the text as a contaminant in both groundwater and surface water

#### Appendix E, Attachments

- 30 Attachment E 3 This section provides tissue data for the EE Radiological data are not included in the attachment and do not appear to be provided in the report These data are discussed in the text and should be included
- 31 Attachment E 4, Aquatic Toxicity Screen Data.
  - a Only Fall 1991 toxicity test results are reported in this attachment Some explanation is needed to justify the lack of data in the Spring or following winter
  - b The toxicity test results that were reported are questionable Test temperatures should have been 20 +/- degrees C The tests were over the allowable temperature range